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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

ANNUAL INVESTIGATIVE PROGRAM

1925

1924-1925

NORTHEASTERN FOREST EXPERIMENT STATION

AMHERST, MASSACHUSETTS

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ANNUAL INVESTIGATIVE PROGRAM - 1925

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NORTHEASTERN FOREST EXPERIMENT STATION

ANNUAL INVESTIGATIVE PROGRAM - 1925

Cooperation.

Regional Program.

More investigative work in forestry has already been done and is now under way in the Northeast than in any other part of the country. This makes it particularly important to correlate the activities of the Experiment Station with those of other forest research agencies, and also to bring about as complete coordination as possible between the activities of these various agencies. Consequently, one of the first tasks undertaken by the Station was to compile a statement of existing projects with notes for each as to its scope, status, plans, and agency by which conducted. This statement was published in mimeographed form during the summer of 1924, and has been widely circulated as a means of disseminating information regarding research activities now under way in the region.

The statement shows a total of more than two hundred projects. This large number indicates clearly the widespread interest in research, but may give an erroneous impression as to the actual amount being done unless it is remembered that most of the projects are handled on a part-time basis by men whose main activities are in other fields. The work is conducted by a wide variety of agencies, from individual timberland owners to the Federal government, but the forest schools are credited with a larger number of projects than any other single group.. By lines of work forest management leads, with forest protection a close second.

A revision of the regional program which is now under way is bringing to light a few additional projects and correcting such errors, mostly minor, as crept into the original statement. It is planned to incorporate these in a supplementary statement, and to postpone the issue of another complete mimeographed edition for at least another year.

Northeastern Forest Research Council.

As another means of bringing about better coordination of forest research activities throughout the region, of stimulating research, of getting the results of research put into actual practice, and of securing advice concerning our own activities, the Northeastern Forest Research Council was appointed by the Secretary of Agriculture during the winter of 1924. This Council consists of sixteen individuals representing different parts of the region, and also the different groups which are themselves conducting or interested in the results of forest research.

The Council has so far held three meetings, - on April 3, 1924, at the Northeastern Forest Experiment Station, Amherst, Mass.; on September 4 and 5, 1924, at the Harvard Forest, Petersham, Mass.; and on February 7, 1925, at the Yale School of Forestry, New Haven, Conn. The next meeting is scheduled for June 22-24, 1925, with the Brown Company at its mills at Berlin, New Hampshire, and at one of its woods headquarters at Cupsuptic, Maine.

The members of the Council have shown a keen interest in its activities and a desire to make it a working body. Recommendations regarding the work of the Experiment Station and of other forest agencies within the region have been adopted at each meeting and followed up by correspondence with appropriate Federal and state officials. It is believed that the Council has already been effective in correlating and stimulating forest research in the region, and that it is exercising a steadily growing influence and leadership.

The four members of the Council whose original appointments were for one year (Messrs. Brown, Kellogg, Slate, and Toumey) were reappointed by the Secretary of Agriculture during the winter for a four-year term.

Advisory Committee from Pulp and Paper Industry.

A somewhat similar but more restricted cooperative contact has been established through the Sub-Committee for the Northeastern States of the Advisory Committee of the Pulp and Paper Industry to the Department of Agriculture. An attempt was made to hold a joint meeting of this sub-committee with the Northeastern Forest Research Council in September, 1924, but only one of its members was able to be present.

The first meeting of the sub-committee was therefore held in New York on February 5, 1925, in connection with the annual meeting of the American Paper and Pulp Association. Its members expressed a desire to cooperate with the Experiment Station through the Woodlands Section of the Association by endeavoring to get the members of that section to undertake studies along such lines and in accordance with such instructions as might be suggested by the Station. A list of suggested projects with accompanying instructions is now in preparation. The sub-committee also arranged for supplying the Forest Products Laboratory with a carload of yellow birch, beech, and hard maple logs for test by the modified pulping process which has been giving such promising results with southern hardwoods.

Massachusetts Agricultural College.

Cooperation has, of course, been close with the Massachusetts Agricultural College, which under the cooperative agreement furnishes quarters for the Station. These now consist of a large recitation room which has been subdivided by partitions into four offices. They have been badly crowded during the past winter, when in addition to the permanent force three temporary clerical assistants have been in the office practically all winter.

We have the promise for next summer of another recitation room, which can be divided into two, or possibly three, offices. With the necessity, however, of providing space for a forest pathologist, a forest entomologist, and Mr. Tillotson, this will not materially relieve the situation. Cramped quarters necessarily interfere more or less seriously with the efficiency of the work, and it is difficult to see how the housing problem can be fully solved except by the erection of a special building, the need for which will steadily increase as the Station increases in size.

Garage space for one car is now furnished by the college, but as a privilege rather than a right. This item was accidentally left out of the cooperative agreement, and the college has so far declined to make any promise as to permanent space, although it has indicated a desire to take care of our needs in this respect as long as possible.

Aside from its inability to furnish us with more adequate quarters, cooperation with the college has proved entirely satisfactory. The surroundings are pleasant, our relations with the college staff are cordial, and the opportunity for easy contact with specialists in other lines is particularly stimulating and helpful. The college forest at Mt. Toby has also proved very useful for the establishment of various experiments within easy reach of Amherst.

Under the terms of the cooperative agreement, a seminar course in forest ecology was given by members of the staff during the past winter to graduate students and faculty members of the college. The course was taken by eight men and apparently proved satisfactory. Among other things, it furnished an excellent opportunity for all of us at the station to brush up on our knowledge of ecology.

Other Outside Agencies.

A special effort has been made to establish and maintain rather intimate contacts with the other agricultural colleges and experiment stations and with the various forest and scientific agencies interested in forest research. These contacts have undoubtedly been of much value in many ways, particularly perhaps in bring about a better understanding of the objects and plans of the Experiment Station, and in establishing cordial relations with the many other organizations which are active in the same field.

Mr. Peirson's studies in forest entomology have been financed entirely through cooperative funds furnished by interested timberland owners, primarily for investigations of the spruce budworm. The work has been conducted in cooperation with the Bureau of Entomology and with the Maine Forest Service. Arrangements have recently been perfected, subject to final approval by the governor and council, under which the work after July 1 will be taken over by the State of Maine, although cooperation with the Experiment Station and the Bureau of Entomology will be continued.

During March, 1925, cooperative funds from anonymous donors to the extent of $2500 a year for the next two years were made available for investigations of the white pine weevil and its control. These funds will be spent through the Bureau of Entomology in cooperation with the Experiment Station. The work will be in charge of H. J. MacAloney, a recent graduate of the New York State College of Forestry, who will be assigned headquarters at the Station.

No other cooperative funds have so far been received. In accordance, however, with a vote adopted by the Northeastern Forest Research Council at its February meeting in New Haven, an opportunity has been offered to the state foresters and timberland owners' associations to cooperate financially in placing the two forest fire studies on the Station's program on a more adequate basis. So far, the response has not been particularly encouraging, and it is still doubtful how much, if any, money will be contributed for this purpose. Apparently, the most which can be hoped for is sufficient to make possible the employment of a temporary assistant during part of the field season, and possibly some clerical assistance during the winter. Some of the state foresters are apparently not convinced of the value of studies of this sort, others are short of funds, and still others appear to feel that all work conducted by the Experimant Station should be financed out of Federal appropriations.

There is a possibility that some of the insurance companies which are interested in timberland insurance may later be willing to pool their efforts with those of the Experiment Station in certain fire studies, and to cooperate financially in their conduct. Tentative plans are now being formulated by the Automobile Insurance Company (a subsidiary of the Aetna) for a conference next winter of insurance men, state foresters, timberland owners, and others interested in the subject. It is possible that some concrete plan for furthering our present fire studies may result from this meeting.

A good deal of valuable cooperation ought gradually to be developed with timberland owners and with other institutions by suggesting to them definite projects and plans of work, along the lines proposed by the Advisory Committee from the pulp and paper industry and by the Northeastern Forest Research Council. These projects may either tie in closely with studies under way at the Station or elsewhere, or they may be selected for the purpose of filling in gaps in the present regional program. As a step toward securing greater uniformity in method, and consequently greater comparability in results, the Station is planning to prepare and distribute working plans for its own projects and standard instructions for the establishment of permanent sample plots. It will also, on request, review and comment on working plans prepared by other agencies.

Other Bureaus in Department.

During the coming year a forest entomologist (H. J. MacAloney), supported in part by Bureau of Entomology appropriations and in part by cooperative funds, will be assigned to the Station. He will, however, have field headquarters at Petersham, where opportunities for the study of the white pine weevil are better than at Amherst. The Bureau of Entomology will also make a survey of the present status of the European pine shoot moth, and will employ a man (J. A. Beal) during the field season to work with Dr. Spaulding on the slash disposal problem and with Mr. Peirson on the spruce budworm, the larch saw fly, the larch case bearer, and the forest tent caterpillar. It is hoped that these activities constitute merely the beginning of a larger program in forest entomology, which is a field of outstanding importance in forest management in the Northeast.

Beginning July 1, a representative of the office of Forest Pathology of the Bureau of Plant Industry (Perley Spaulding) will also be assigned to the Station. His work will be primarily on the chestnut blight and on slash disposal, with special reference to the fire hazard created by different species under different methods of disposal, and to the danger of spreading diseases from slash to living trees. Investigations of the white pine and pitch pine blister rusts which are already under way will be continued. This field also is one of outstanding importance in the region, and work in it should be expanded as rapidly as funds permit.

Arrangements have been made with the Weather Bureau to issue fire weather forecasts to state foresters in the region on request. The four northern New England states will be handled from Boston, Connecticut and Rhode Island from New Haven, and New York from Albany. Lack of funds makes it necessary to start the work on a limited scale and prevents the employment of additional meteorologists to handle either the forecasts or special studies aimed at increasing the accuracy of and period covered by such forecasts. It is hoped that one or more meteorologists for this purpose may be available in the near future, and that they may be assigned to the Experiment Station, where they can work in intimate contact with those engaged in fire studies here.

The assignment of one or more men from the Bureau of Soils would be most helpful in connection with many of the problems which are constantly arising, particularly in silviculture and forestation. It is becoming more and more generally recognized that silviculture is largely a matter of soil culture, yet our knowledge of the relation of different soils to tree reproduction and growth and of the effect of different methods of cutting on soil conditions is extremely meager. Expansion of the Station's work in the field of forest soils should be brought about as promptly as possible and in cooperation with the Bureau of Soils.

Station Program.

General Scope and Character of Work.

After thorough consideration of the outstanding forest problems of the region and of the work already done and under way by other research agencies, it was decided to concentrate the efforts of the Experiment Station during the first few years at least on problems pertaining chiefly to the spruce northern hardwoods forest in the northern part of the region. Comparatively little investigative work has been done here, while a great deal has been done in the white pine and sprout hardwoods regions. This decision was approved by the Northeastern Forest Research Council after a thorough discussion of the situation.

Most of the work so far has been conducted by the temporary sample plot method. Altogether twelve permanent sample plots were established during 1924,-four on the White Mountain National Forest in connection with project Mc-1 to study the effects of different methods of cutting in a spruce northern hardwoods forest; and eight on the Massachusetts Agricultural College forest at Mt. Toby in connection with projects Fs-d-1, M-3, and M-4. The establishment of permanent sample plots elsewhere was deferred pending the selection of sub-station sites.

The bulk of the work to date has been in mensuration and silviculture. This is primarily because information as to the possible yield from spruce and balsam fir stands, and as to the best methods of cutting to use in such stands to secure satisfactory natural reproduction, appears to be of primary importance. Next in importance to the investigations in mensuration and silviculture come those in fire control, which will be pushed as rapidly as available men and money permit. Reforestation studies are of comparatively minor importance in the region. Much still remains to be learned as to the best methods of nursery practice and methods of planting, and as to the suitability of different species to particular sites, but enough is already known to permit planting to be done satisfactorily with any of the standard species.

The importance of fundamental studies as an integral part of the work of the Station is becoming more and more appreciated. Aside from certain phases of forest mensuration, the work which we have so far undertaken is almost wholly of an empirical character. Such work is of very real value in enabling us to secure immediate, if often partial, answers to pressing questions, and will undoubtedly continue indefinitely to figure largely in the activities of the Station. There will always be problems to which reasonably satisfactory answers can be secured in this way in a reasonably short time, and there will always be a demand on the part of the timberland interests and others for immediate and practical results. At the same time, the results of empirical studies will be of the greatest value only as these are supplemented by fundamental studies which will make possible their more intelligent interpretation and wider application. It has been the experience of the agricultural experiment stations that in the long run fundamental studies are of greater value, even from the standpoint of practical application, than empirical studies, and there is no reason why this should not prove equally true in forestry.

We are at present handicapped in undertaking fundamental studies not only by the pressure for results but by the lack of qualified men. Few foresters have had the training necessary to enable them to undertake really fundamental work effectively, and until more foresters with training of this sort are turned out by the schools, it will be necessary to rely largely on specialists in allied fields. Tree physiology is one of these fields in which further research is particularly needed. We now know surprisingly little as to the physiological requirements of different species for moisture and various soil nutrients, as to the way in which these nutrients are utilized, and as to the importance of symbiotic organisms in tree nutrition. Further knowledge along these lines is practically essential to progress in soil investigations, and the two lines of work can advantageously be developed simultaneously.

Tentative plans were made a year ago for the employment of a plant physiologist, but there was difficulty in locating just the right man, and it finally proved impossible to finance a high caliber man of the type desired with our present allotment. The development of thoroughgoing work in this field is, however, regarded as of outstanding importance, and the employment of one or more physiologists, and possibly ecologists, as one of our most pressing needs. Their services would be fully as valuable to the forest entomologists and forest pathologists attached to the Station as to the foresters themselves.

Demonstration and Publicity.

The primary function of a forest experiment station is forest research, and we have felt that we can best justify our existence by sticking pretty closely to that job. In the long run, the success or failure of the Station will be judged by the amount and quality of its research, and by the contribution made by this research to the solution of the forest problems of the region.

On the other hand, full value will not be obtained from research unless its results are made known and their application demonstrated in the field. Demonstrations to test on a commercial scale the results of small scale experiments will often be necessary before a project can be regarded as completed. These can perhaps be made to best advantage on demonstration forests connected with the substations, although there will doubtless be cases where cooperation with some owner in another part of the region will be not only necessary but desirable.

After results have been secured and their applicability demonstrated, one of the functions of the Experiment Station should be to keep the state foresters and other forest agencies fully informed. Eventually the full time of one man can be spent to good advantage in conducting demonstrations and in serving as a liaison officer to pass along results to, and maintain contacts with, other agencies. The handling of more or less routine requests for advice from private owners and others is properly a function of the state foresters, and so far as possible queries of this sort will be referred to them for attention.

Publicity goes hand in hand with demonstration as a means of acquainting timberland owners and the general public with the activities of the Station and of getting results put into actual practice. Current news items and more elaborate articles and bulletins are effective in these directions, but it is important to avoid jumping at conclusions and to make sure that any publicity emanating from the Station has a solid background of fact. It is better to appear somewhat less frequently in the newspapers and in periodical literature than to court publicity by giving out half-baked conclusions.

Sub-Stations.

No sub-stations have yet been established. In the spring of 1924 an investigation was made of an available building on the White Mountain National Forest, but for various reasons it was felt that we were not at that time ready to decide on that particular location as unquestionably the best on the Forest.

The attached map shows roughly the major forest regions in the Northeast. It is questionable whether sub-stations will be justified in all of these regions for many years at least. Present plans contemplate the selection within the next few years of sub-stations in Central Maine; on the White Mountain National Forest, in New Hampshire; in Central Vermont; and on the Adirondack Plateau in New York. All of these sub-stations will be situated either in or in close proximity to the spruce northern hardwoods region. This concentration is felt to be justified by the fact that so little investigative work has been or is now being done within this region, and that local conditions within the region vary sufficiently to make permanent studies in different parts of the region important. Furthermore, the Vermont sub-station will almost certainly be within fairly easy reach of part of the white pine region, as will also, in all probability, the White Mountain sub-station.

Amherst itself will serve as a sub-station for all of the territory within reach of it, which includes a considerable part of the white pine and sprout hardwoods regions. Several projects have already been started on the College Forest at Mt. Toby, and a study of the effect of fire in second growth sprout hardwoods has been started on the Simsbury State Forest, Connecticut. It is believed that all of the work necessary in these regions, both of which are already pretty well covered by the Harvard and Yale Forest Schools and by the Connecticut and New Hampshire Agricultural Experiment Stations, can be handled satisfactorily from Amherst, for many years at least.

More question may, perhaps, be raised as to whether sub-stations should not be established fairly soon in the Catskill Mountains, and in the Allegheny hardwoods region of central and western New York. So far as the Catskills are concerned, there would appear to be no particular haste, since a large part of the area is now owned by the state, and under the Constitution cannot be logged. In central and western New York, the New York State College of Forestry and the Department of Forestry at Cornell University are active. The latter is now concentrating all of its new research work in that part of the state, so that the field is being fairly well covered without assistance from the Experiment Station. Eventually, however, it is probable that a sub-station should be established in that region, possibly in cooperation with Cornell.

It is definitely planned to select a site this summer for the sub-station on the White Mountain National Forest. Arrangements have already been made to meet District Forester Kelley and Assistant District Forester Evans in order to go over the proposition on the ground with them and with Supervisor Yarnall. The selection of sub-stations in other parts of the region is made more difficult by the absence of National Forest land. It is considered essential that no selection be made of any area which is not in public ownership of one sort or another, or where, if in private ownership, absolute permanence cannot be guaranteed.

Whether definite selections can be made during the coming year is still doubtful, although an effort will be made to locate suitable sites, particularly in Vermont and in the Adirondacks. Offers of cooperation have been received from Middlebury College, the New York Conservation Commission, the New York State College of Forestry, and Finch, Pruyn and Company. On the other hand, we are not certain as to whether any of the lands in these ownerships cover exactly the conditions in which we are most interested. The fact that no offers of cooperation have been received from anyone in Maine makes it doubtful whether any selection can be made there this year.

The prompt selection of sub-stations is particularly important in connection with the establishment of permanent sample plots. Such plots should be established as soon as possible in the spruce yield and methods of cutting studies, and should of course be definitely tied up with a sub-station. On the other hand, it would be unfortunate to pick out prematurely a site which might be suitable for these particular projects, but not permanently satisfactory from the standpoint of other problems in the region or in other respects, such as ownership. On the whole, it is felt best to go slowly in the selection of sub-station sites until we are sure that the best available location has been found, even if this delays somewhat the establishment of desirable permanent sample plots.

As to the two classes of sub-stations described in Mr. Clapp's letter of January 13, 1925, we believe that principal emphasis should be laid at this time on the second class, consisting of a group of sample plots. On the White Mountain National Forest, however, it may be possible to establish both classes of sub-stations either this year or in the near future. This would mean the selection of a center of work within easy reach of an area which could be set aside as a demonstration forest, and also within easy reach of other parts of the Forest covering different conditions where additional sample plots could be established. Plots would be concentrated, so far as practicable, on the demonstration forest, which would also be used for strictly demonstration purposes; but the selection of such a demonstration forest should not preclude the establishment of other plots when more desirable conditions can be found elsewhere.

Eventually it is hoped that it may be possible to station a year-long man at the White Mountain sub-station to take local charge of both the demonstration forest and other experimental areas. So far as administration is concerned, we believe that general supervision of the demonstration forest, including decisions as to the experiments to be conducted and other operations to be performed, should come under the experiment station; but that fire control, improvement work, and all phases of timber sales except decision as to the method of cutting and slash disposal to be used, should come under the supervisor of the Forest.

In this connection, emphasis should be laid on our desire to cooperate fully with the administrative organization in its conduct of investigative work along the lines suggested in Mr. Clapp's R Supervision letter of June 28, 1924. The District and Forest officers can be of much help to us in the selection and conduct of Experiment Station projects, and on the other hand the Station can undoubtedly be of help to them in developing plans and methods, and in some cases in the actual establishment and measurement of sample plots. Close cooperation between the two organizations is of prime importance.

Outside of the National Forest, it is doubtful whether we shall be in a position to establish a demonstration forest for some years, although an unexpected opportunity for this may, of course, arise. Should the forest property of the New York State College of Forestry in the western Adirondacks be selected as the sub-station for that region, it might be possible to make this a demonstration forest under the joint supervision of the College and of the Experiment Station. So far as sub-stations on private lands are concerned, there is always the possibility that a concern or individual will gradually become sufficiently interested to set apart as a demonstration forest that portion of the area in which most of the permanent sample plots are concentrated.

Major Projects.

Five major projects are recognized in the program for the Station proper. These are as follows:

(1) Methods of cutting in pure and mixed spruce and balsam fir stands. This is an extremely comprehensive project on which active work will be necessary for the next two or three years. In addition to covering several types which are of rather widely varying composition and occur on a wide variety of sites, the study is attempting to determine the results of different methods of cutting not only qualitatively, but also quantitatively. In other words, an effort is being made to determine the yield which may be expected from the residual trees left after logging, and also from the reproduction which is on the ground at the time of or which comes in after logging. To secure representative and dependable data for so wide a field and such a wide variety of conditions is a big task.

It should be possible to prepare a progress report of sufficient general interest for publication following each year's work, but it is doubtful whether a government bulletin will be justified for another two or three years. During the coming season it is planned to continue the work along the same lines as last year by covering other types and other parts of the region, particularly Maine and New York.

(2) Growth and yield of spruce and fir in the Northeast. This project is rather closely associated with the preceding, and should give data which can be used in the prediction of yields to be expected after the virtually clear cutting now practised in most pulpwood operations. The bulk of the even-aged fully stocked second growth spruce stands of commercial size in the Northeast have already been measured, and it is probable that sufficient data are now available for the preparation of normal yield tables for red spruce. Some additional plots will be taken in fully stocked stands with a considerable proportion of white spruce and balsam fir, and additional yield figures from partially stocked plots will be secured if necessary. Special attention will be paid to the application of normal yield tables, including as much field work as seems advisable. This involves a study of the effect of understocking and of mixtures on the yields shown in a normal table, of the determination of site quality in the case of cut-over lands and young stands, and of the progress of poorly stocked stands toward a more normal stocking with increasing age.

If sub-station sites can be selected, permanent sample plots will be established in connection with this project, as well as in connection with the methods of cutting project. The determination of yield in uneven-aged stands is a part of the project which will not be reached until next year.

(3) Development of universal taper and volume tables. This project includes more work of a fundamental character than any other at present on the program, involving as it does the entire question of tree form, its expression, and causes. The prospects of being able to develop universal volume tables which will be more accurate and fully as easily used in the field as those now in existence are promising. Even if this possibility should not materialize, the work will undoubtedly yield much information which will be of great value from a scientific standpoint, and perhaps in practical ways which cannot now be foreseen. Present plans contemplate pursuing the work along lines already developed and following out such new clues as may appear from time to time.

The study has developed a simple empirical equation for the stem curve which seems to be applicable quite generally. If the form of tree stems is conditioned by mechanical principles, it should be possible to check this equation by analytical methods and by laboratory tests. If the wind pressure on the crown is considered as concentrated at a certain point, the center of gravity of the crown, the stem should take the form of a cubical paraboloid with tip at the height of the form point. This is, of course, contrary to fact, but no attempt has yet been made to deduce analytically the equation of the stem curve on the assumption of stress distributed in proportion to the crown's position and shape. The problem is complicated by variations in density of the wood, which usually correspond to variations in strength at different points on the stem. These variations have been studied in relation to this problem by a Swedish investigator. Cooperation with the Forest Products Laboratory would prove very desirable in working out the mechanical phases of this problem.

(4) Analysis of forest fire statistics.

(5) Prediction of fire conditions.

Less progress than was hoped has been made on these two projects during the past year, because pressure of other work has prevented Mr. Dana from devoting to them the time which they deserve. Arrangements have, however, been made with all of the state Foresters for the use of their fire records, and the statistics covering Massachusetts fires for 1921, 1922, and 1923 have been placed on punch cards in the Washington office. Additional records will be put on punch cards and their analysis by means of the tabulating machine undertaken as rapidly as possible.

Mention has already been made of the arrangements with the Weather Bureau for supplying fire weather forecasts to the state foresters and of the interest of some of the insurance companies in the entire question of fire studies. In addition to working up available statistics as much as possible will be done in working out methods for determining the actual inflammability of forest fire fuels and in determining what degree of inflammability indicates fire hazard under different conditions. During the coming year Mr. Stickel will assist Mr. Dana with the work, and should any cooperative funds materialize they will be used to provide him with additional help during at least a part of the season.

The Northeastern Forest Research Council at its last meeting recommended that we concentrate our attention on the five major projects listed above. With the assignment to the Station of Dr. Spaulding and Mr. MacAloney the studies of the chestnut blight, of slash disposal, and of the white pine weevil should also take their place as major projects. Mr. Peirson's work on the spruce budworm will also continue of major importance, although primary responsibility for its direction will hereafter rest with the Maine Forest Service.

Minor Projects.

So far as minor projects are concerned, it seems unnecessary to elaborate on the information given in the appended statements for specific projects. Many of these are concentrated on the college forest at Mount Toby, where field work can be handled when it is impossible in the northern part of the region. No material expansion of any of the minor projects is contemplated during the present calendar year.

A few words should, however, be said in regard to Mr. Gast's work and the cooperative arrangement with Harvard University. For various reasons, among which difficulties with equipment were prominent, it proved impossible for him during the past summer to secure as many field records of environmental factors as had been hoped. He has, therefore, not had sufficient material to prepare a thesis for a doctor's degree, and another year will be necessary before this can be secured. Professor Fisher and Dr. Bovie are anxious that his work during this year should be continued under the present cooperative agreement. This involves an annual contribution on our part of $400 for salary and $200 for expenses, the balance being furnished by Professor Fisher, with some equipment by Dr. Bovie.

A rather lengthy conference with Professor Fisher, Dr. Bovie, and Mr. Gast a few weeks ago developed the fact that Dr. Bovie feels quite strongly that Gast's work during the coming year should center very largely upon a study of light, with particular reference to methods of measurement, and to actual measurements not only of total light but also of different kinds of light and their relation to tree growth. Dr. Bovie, as a result of some recent work of his own and of other investigators, feels that light, although by no means the only important factor controlling tree reproduction and growth, is probably more important than has been generally recognized, and that more concrete results are likely to be secured from a year's intensive study of it than from a similar study of any of the various soil factors. His own interest in and knowledge of the subject mean that he will work more closely with Gast and will furnish him with more equipment than would be the case in some other field, such as soil moisture. Since the work is still in the developmental stage, it seems best to have it continued for the present chiefly at Petersham, where a start has already been made, where laboratory facilities are available, and where the work can be kept more closely under Dr. Bovie's personal supervision than would be the case in the spruce region.

It is strongly recommended that this arrangement be approved. The work on light is unquestionably important, and there seems to be a real opportunity for getting somewhere with it. It will also be possible for Mr. Gast to continue the work which he has already started on soil temperature and soil moisture, and perhaps to do something with soil acidity and soil bacteria. The fact that Mrs. Gast will work with him this summer, although without pay, will undoubtedly increase considerably the ground which he can cover effectively. While in some ways it would be preferable to have more work done in the spruce region, as we had at one time hoped might be possible, under the circumstances better results will apparently be attained by continuing the work at Petersham and along the lines emphasized by Dr. Bovie. In addition to the concrete results obtained from the project itself, the contact which we obtain with Harvard University through the cooperative arrangement is well worth while and the $600 devoted to the project a good investment. Neither Prof. Fisher nor Mr. Dana is yet convinced as to whether Gast is developing into the type of man whom we wish to secure permanently for experiment station work. The probabilities are that he is, and a continuation of the present arrangement for another year should put us in a position to feel fairly sure on this point.

All of the permanent sample plots established prior to the organization of this station which still remain under the supervision of the Forest Service will be remeasured during the present year. Those which tie in closely to any of the current projects of the Station will be transferred to those projects, and the rest carried as a separate project with the designation M-5 until specific projects to which they can be assigned are added to the program.

Project M-1 has been expanded to include the encouragement of private forestry in accordance with the instructions in Col. Greeley's S Forest Extension Cooperation with Private Land Owners letter of April 4, 1924, and Mr. Clapp's RS Cooperation letter of April 18, 1924. A project on regional yields (ME-4) has been added to last year's program in accordance with the instructions in Mr. Clapp's RS ME Regional Yields letter of August 4, 1924. The preparation of a manual on forest measurements (listed on page 12 of the Plan of Work for 1925 for the Washington Staff) has also been added as project ME-3 because of Mr. Behre's membership on the special standardization committee and because of the cooperation being rendered by all of the forest experiment stations.

Mention should perhaps be made of a few activities not included in the formal program. At the request of the Forest Products Laboratory the Station has arranged to expose and to secure monthly records on 18 panels of spruce and ash covered with different coatings which are being tested to determine their relative value in aircraft construction. We have also facilitated contacts between the Laboratory and the Massachusetts Agricultural Experiment Station in the feeding and nutrition tests of hydrolyzed Douglas fir and eastern white pine sawdust. A soil type map of Mt. Toby has been made at our request by the Agricultural Experiment Station, and Prof. Gross and Mr. Dana will make a forest type map to accompany it.

No projects shown on last year's program have been completed or discontinued.

New Projects.

Few new projects are proposed for the present year. We have felt that it is best to concentrate our efforts on relatively few projects and to do a thorough job on them, rather than to do a more superficial job on a much larger number. One respect in which the work of the Experiment Station differs materially from that of the forest schools and most other research organizations in the region is that we attempt to secure a much larger body of data on each project. In the methods of cutting study, the yield table study, and the taper and volume table study, for example, we are attempting to secure sufficient material to make the conclusions finally reached thoroughly sound and to obviate any necessity of repeating the work for many years. Moreover, each of these projects covers a wide field and might well be subdivided into a considerable number of sub-projects.

Still another factor tending to keep down the number of new projects is the attempt that we are making to have the office work keep up with field work. Ordinarily there is a strong tendency to feel that field parties should be started out as soon as the weather permits and kept out till winter sets in, and that if ample field data are secured the office work will more or less take care of itself. It has apparently been the universal experience at other experiment stations, and we are finding the same to be decidedly true here, that this is not the case.

With the character of projects which we now have under way, field work actually requires less time than office work and can be done most effectively only when the latter is kept strictly up-to-date. We are, therefore, making a special effort to work up all data collected during the previous field season before going into the field again. Professor Toumey is said to have reached the conclusion that office work normally requires about twice as much time as field work, and our experience during the past year and a half would seem to indicate that this proportion is approximately correct.

Mention has already been made of the new projects on the white pine weevil, chestnut blight, slash disposal, and white pine and pitch pine blister rusts to be undertaken by the representatives of the Bureau of Entomology and of the Bureau of Plant Industry assigned to the Station. The only new project suggested for the Station proper is a study of the effect of pruning on white pine at different ages. This is a project on which little or no systematic work appears to have been done, and which can advantageously be undertaken on plantations and natural stands at Mt. Toby in cooperation with Professor Gross. While it does not rank as a major problem of outstanding importance, it is one on which additional data is much needed, and which it is believed we are justified in undertaking because of the possibility of doing so with comparatively little additional effort. It would also fit into the general plan of developing our experimental work on the college forest at Mt. Toby as rapidly as possible.

Although Mr. Tillotson's work will not form part of the Experiment Station program, his prospective assignment to Amherst, with headquarters in the same building as the Station, to handle the states relations activities of the Branch of Forest Management in the Northeast, may appropriately be mentioned as establishing a new and highly desirable contact with another branch of the Service. If the Northeast is one of the regions selected for the proposed study of forest taxation, it is hoped that that work also will be carried on in close cooperation with the Experiment Station. The wide variety of forest conditions, both as to ownership and character of the forest, the numerous attempts which have been made to modify the application of the general property tax to forests, and the widespread interest in the subject would seem to make the region a particularly good one for inclusion in the study.

FINANCES

Silvical Investigations.

Our estimated expenses for the fiscal year 1926 on the basis of an allotment of $27,495 are as follows:

	Salary	Expenses
S. T. Dana, Director,	$ 5,200	$ 600
C. E. Behre, Associate Silviculturist	3,300	450
M. Westveld, Associate Silviculturist	3,000	500
W. H. Meyer, Assistant Silviculturist	2,400	400
P. W. Stickel, Junior Forester	1,860	400
P. R. Gast, Agent,	400	200
M. E. Turrell, Senior Clerk	1,860	—
R. M. Delaney, Assistant Clerk	1,500	—
Junior Clerk-Stenographer (4½ months @ $110)	495	—
Field Assistants (3 for 5 months @ $90.00)	1,350	1,200
Temporary clerical assistants (3 for 5 months @ $110)	1,650	—
Operation and maintenance of Station automobile		450
Telephone and telegraph		70
Freight and express		40
Equipment, supplies, and miscellaneous		170
	$23,015	$4,480

The new Junior Clerk-Stenographer will be needed for the representatives of the Bureaus of Entomology and Plant Industry and of the Branch of Forest Management who will be quartered at the station next year. An appointment will hardly be necessary before October 1, and the Branch of Forest Management has agreed to meet half of the salary. This leaves the equivalent of four and a half months of full time to be provided for by the Station.

In this connection I should like to emphasize the desirability of working out some arrangement by which the Bureaus of Entomology and Plant Industry will meet the expenses of the stenographic and clerical assistance needed by their representatives. With our meagre allotment it is already difficult to find even the $495 now needed, and the burden will become increasingly great as additional specialists from other bureaus are assigned to the station and as our own work expands. Is it not feasible to work out some plan by which all clerical expenses will be divided on a pro rata basis between the different bureaus concerned in proportion to the amount of clerical assistance actually used by each?

It is believed that no explanation is needed of the other items. Should any promotions be made during the year they will have to be financed by reducing the amounts for travel and for temporary assistance. No provision is made for Messrs. Spaulding, Mac Aloney, and Beal, whose salaries and expenses will be taken care of by the Bureaus of Plant Industry and Entomology.

Attention should be called to the fact that an additional allotment will be needed in another year to continue the work of the station effectively on even its present basis. It seems reasonable to assume that some promotions will have been made by that time. The present station automobile will need replacing and a new car, preferably a truck, could be used to excellent advantage. More temporary assistance than provided for in the present budget is needed both for field and office in order to use the permanent staff to best advantage. Additional funds are likely to be needed for office equipment and clerical assistance for specialists from other bureaus unless some plan can be devised by which they will meet these expenses themselves. Without additional allotment it is clear that the work of the station cannot be increased by the addition of a man of Mr. Gast's type, and it is doubtful whether the permanent staff can be maintained at even its present size.

Cooperative Funds.

It is estimated that on July 1, 1935, the balance in the cooperative fund for spruce budworm investigations will be $2,509.54. Present indications are that the Maine Forest Service will be able to take Mr. Peirson on its payroll at that time, when his official Department title can be changed from Agent to Collaborator without pay. The balance remaining in the cooperative fund will be used from time to time for the hire of temporary assistants for the budworm studies, for payment of Mr. Peirson's expenses in connection with work of the Department, and possibly for the purchase of equipment and other purposes.

No other cooperative funds are now available, since the $2,500 a year for the next two years for white pine weevil investigations will be spent through the Bureau of Entomology. Should any cooperative money later be made available for fire studies, it will be used for the employment of temporary assistants on the two projects in this field.

Except in the case of these fire studies, where action was taken at the request of the Northeastern Forest Research Council, no attempt has so far been made to secure cooperative funds, either from the state departments of forestry or private owners. We have felt that interest in expanding the activities of the station will be much greater after concrete results on some of our current projects have been secured and published, and that it would be unwise at this time to make any special effort to increase Federal appropriations by cooperative contributions. The difficulty of securing cooperative funds is also increased by the fact that there are so many other forest research agencies in the region, all of which are limited in their activities by inadequate resources.

One possible and desirable use of cooperative funds which should be given careful consideration is for the establishment of fellowships. These might be supported by one of the large foundations, or by any of the wood-using industries, or by individual timberland owners or others interested in the work. Such fellowships could advantageously be used for the employment either of graduate students or more mature men working under the direction of the permanent staff. There would seem to be no reason why fellowships should not be established as appropriately and as effectively at forest experiment stations as at educational and industrial institutions, where they have been common for years, and at agricultural experiment stations, where they have recently been becoming more common.

PUBLICATIONS

Last Year.

"Is Taper Based on Form Quotient Independent of Species and Size?" by C. E. Behre. Published in Journal of Forestry for March, 1924.

"Computation of Total Cubic Content of Trees", by C. E. Behre. Published in Journal of Forestry for October, 1924.

"Notes on Eccentric Diameter Growth", by C. E. Behre. Submitted to Journal of Forestry in December, 1924. Published May & June 1925 3pp.

"The Forests of Maine", by S. T. Dana. Published as Bulletin No. 2, Maine Forest Service, 1924. 28pp.

"Forest Fires and Recreation", by S. T. Dana. Submitted to American Forests and Forest Life in March, 1925. ?

"Estimating Forest Insect Damage", by H. B. Peirson. Published as Bulletin No. 3, Maine Forest Service, 1924. 22pp

"The Grazing of Cattle and Horses in Pine Plantations", by P. W. Stickel and R. C. Hawley. Published in Journal of Forestry for December, 1924. 14pp

"A New Device for Taking Maximum and Minimum Soil Temperatures in Silvical Studies", by J. W. Toumey and P. W. Stickel. Submitted for publication in Ecology in April, 1925. 7pp

"Study of Seedling Growth in Virgin Softwood Forests", by H. C. Belyea and P. W. Stickel. Submitted for publica- ?

tion as a contribution from Department of Forest Engineering, New York State College of Forestry.

Next Year.

"Form Class Taper Curves and Volume Tables and Their Application", by C. E. Behre. Estimated length, 30 printed pages plus 22 tables and 56 figures. Suggested for publication in Journal of Agricultural Research. Ready for submission in spring or summer of 1925.

"Application of Form Class Volume Table System to Red Spruce, White Spruce, and Balsam Fir", by C. E. Behre. Estimated length 20 printed pages plus 15 tables and 15 figures. Suggested for publication in Journal of Agricultural Research. Ready for submission in winter or spring of 1926.

"Timber Growing and Logging Practice in the Northeast", by S. T. Dana and R. Zon. Estimated length 50 printed pages. Suggested for publication as Department bulletin. Ready for submission in spring of 1925.

"New Forests for Old", by S. T. Dana. Estimated length 5 printed pages plus 6 photographs. Suggested for publication in American Forests and Forest Life. Ready for submission in spring or summer of 1925.

"Forest Experiment Stations -- Their Development and Future", by S. T. Dana. Estimated length 20 printed pages. Suggested for publication in Journal of Forestry. Ready for submission in summer or fall of 1925.

"Forest Fires in the Northeast", by S. T. Dana and P. W. Stickel. Estimated length 20 printed pages plus 12 tables and 12 figures. Suggested for publication in Journal of Agricultural Research. Ready for submission in late winter or spring of 1926.

"Progress Report on Yield of Red Spruce in the Northeast", by W. H. Meyer. Estimated length 15 printed pages plus 6 tables and 6 figures. Suggested for publication in Journal of Agricultural Research. Ready for submission in summer or fall of 1925.

"Growth and Yield of Even-aged Stands of Spruce and Balsam Fir in the Northeast", by W. H. Meyer. Estimated length 40 printed pages plus 12 tables and 10 figures. Suggested for publication as Department bulletin. Ready for submission in spring of 1926.

"Replacement of Chestnut in Northeast", by C. F. Korstian and P. W. Stickel. Estimated length 15 printed pages plus 5 tables. Suggested for publication in Journal of Agricultural Research. Ready for submission in spring or summer of 1925.

"Podsol Formation in Forest Soils", by P. W. Stickel. Estimated length 10 printed pages plus 2 tables. Suggested for publication in Journal of Forestry or Ecology. Ready for submission in fall of 1925.

"Reproduction on Cutover Pulpwood Lands", by M. Westveld. Estimated length 6 printed pages plus 4 tables and 3 figures.

Suggested for publication in Journal of Forestry. Ready for submission in fall of 1926.

"Growth on Cutover Pulpwood Lands", by H. Westveld. Estimated length 15 printed pages plus 6 tables and 5 figures. Suggested for publication in Journal of Agricultural Research. Ready for submission in late winter or spring of 1926.

It is impossible to state at this time what progress reports may be ready for submission during the coming year by Messrs. Spaulding, Peirson, and Mac Aloney.

APPENDIX

Statements on Individual Projects

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FORESTATION

Project. Source of seed - Scotch pine (Fs-d-1).

Scope. To determine the relative desirability of stock raised from Austrian and Baltic Scotch pine seed for planting in the Northeast; the relative development of Scotch pine, red pine, and white pine on the same site; and the feasibility of underplanting Norway spruce for Christmas tree stock in mixture with pine.

Status. A series of 4 plots, each ½ acre in size, was planted in the spring of 1924 as follows: Plot 1, 2-year-old Baltic Scotch pines; Plot 2, 2-year-old Austrian Scotch pine; Plot 3, 2-1 red pine; Plot 4, 2-1 white pine. Trees were planted 6.6'x6.6'. The west one-half of each plot was underplanted to Norway spruce, one spruce being planted in the center of each 6.6'x6.6' square.

Plans. Fail places will be filled in the spring of 1925 with the same stock as that used in the original plantings, and an additional supply of this will be reserved in nursery transplant beds for future fillings in order to keep the plantation fully stocked. Records will be continued indefinitely. Additional nursery sowings will be made as Scotch pine seed of known origin is available.

Assignment. M. Westveld, Northeastern Forest Experiment Station, in cooperation with Massachusetts Conservation Commission and Massachusetts Agricultural College.

MANAGEMENT

Project.	Practice of forestry by private owners (M-1).
Scope.	To secure information as to the extent to which forestry is being practiced by private owners, the general character of the work being done, and the results secured; and to encourage the practice of private forestry by personal contact, addresses, correspondence, general publicity, publications, and demonstrations.
Status.	A few new examples were secured and new contacts established in 1924.
Plans.	A continuing project on which additional data will be secured and additional assistance to private owners rendered just as far as work on other projects permits.
Assignment.	Staff, Northeastern Forest Experiment Station, in cooperation with State Foresters, Dark Entry Forest, Conn., and other organizations and individuals.

MANAGEMENT

Project. Management of sprout hardwood stands (M-2).

Scope. To determine the best methods for the cutting, reproduction, and subsequent handling of sprout hardwood stands in southern New England.

Status. Five permanent sample plots were established on the Simsbury State Forest, Conn., in the spring of 1924. Three of these were on young sprout land recently burned, and two on adjacent unburned land. Of the first three, one was thinned out of dead material, one is to be left untouched, and one to be burned lightly periodically.

Plans. The plots will be inspected this year and the number of dead trees and degree of recovery determined. One plot will be burned lightly as soon as the accumulation of litter is sufficient, probably in the fall of 1925 or spring of 1926.

Assignment. W. H. Meyer, Northeastern Forest Experiment Station, in cooperation with Connecticut State Forester.

MANAGEMENT

Project. Replacement of chestnut (M-3).

Scope. To determine what is taking place on blight-killed areas and what species should be favored as substitutes for chestnut from the standpoint both of silviculture and utilization.

Status. (a) Two ½-acre permanent sample plots were laid out in June, 1924, on the Mt. Toby forest on areas where the blight-killed chestnut had been removed and white pine planted. One plot will be held as a check plot, while on the other pine will be favored by cleanings and weedings of the hardwoods.

(b) A field survey was made in June-July, 1924, on blight-killed areas near New Haven, Woodbury, and Portland, Conn. Permanent sample plots in the chestnut-mixed hardwood type were remeasured, and some temporary plots to study natural reproduction on areas where the dead chestnut has and has not been removed were taken. The effect of the death of the chestnut in accelerating the growth of remaining trees was also studied.

Plans. (a) Weeding in the permanent sample plot established in 1924 will be done this spring. A third ½-acre plot will be put in where the dead-chestnut is still standing to observe natural replacement under this condition. All plots will be remeasured periodically.

(b) All field work was completed during 1924, and results will be published in a joint article during the spring or summer of 1925.

Assignment. (a) P. W. Stickel, Northeastern Forest Experiment Station, in cooperation with Massachusetts Agricultural College.

(b) P. W. Stickel, Northeastern Forest Experiment Station, in cooperation with C. F. Korstian, Appalachian Forest Experiment Station.

MANAGEMENT

Project. Management of eastern hemlock (M-4).

Scope. To determine the best methods for the cutting, reproduction, and subsequent handling of hemlock in both pure and mixed stands.

Status. In the spring of 1924 a series of three ¼-acre plots was established on an area on Mt. Toby cut over the previous winter. On ¼-acre, red pine 2-1 transplants were set-out with as nearly a 6x6 spacing as hemlock understory would permit. On another ¼-acre, 2-1 white pine were set out in the same way. The third plot was held as a check without planting. Brush was scattered on one-half of each plot and removed on the other half. The location of planted and natural pine seedlings, residual hemlock, and stumps of trees removed were mapped by plane table and alidade. The approximate area of crown spread of the existing hemlock was also sketched on the maps. Notes on size and vigor of each tree were also taken.

Plans. Similar series of plots will be established in 1925 or 1926, but the work will be less intensive. The detailed map will be omitted and the trees and seedlings will be tallied separately by 1/100 acre subdivisions. This will afford a basis for observing the effect of different seasons on the survival and growth of the hemlock and interplanted pine.

Assignment. C. E. Behre, Northeastern Forest Experiment Station, in cooperation with Massachusetts Agricultural College.

MANAGEMENT

Project. Permanent sample plots (M-5).

Scope. To maintain the permanent sample plots which were established prior to the organization of the Northeastern Forest Experiment Station and which do not fall under any of its current projects.

Status. A considerable number of the permanent sample plots for the study of growth and yield, methods of cutting, and natural reproduction established in the Northeast prior to the organization of the Northeastern Forest Experiment Station were turned over some years ago to various forest schools and state foresters, but about a hundred were retained by the Forest Service. Remeasurements are made periodically by the agency concerned and a duplicate set of figures turned over to the Forest Service.

Plans. Plots which are still under the supervision of the Forest Service and which have not been measured since 1915, 1916, or 1920 will be remeasured in the spring of 1925. Compilation of figures from these and other plots will be undertaken as opportunity offers and as the amount of data available justifies.

Assignment. Staff, Northeastern Forest Experiment Station.

MANAGEMENT

Project. Slash disposal (Mb-1).

Scope. To determine (a) the relation of slash of various species to protection of the forest from fire, disease, and insects, and (b) the desirability of various methods of slash disposal.

Status. New project. No thorough studies have yet been made of the disintegration and disappearence of slash in the Northeast, and the methods of slash disposal now in use or advocated are based almost wholly on general observations.

Plans. During 1925 special attention will be paid to the agencies responsible for the disintegration of slash of various species, particularly hardwoods; to the rate at which such disintegration takes place; to the period during which slash normally constitutes a fire hazard; and to the extent to which slash may serve as a breeding ground for diseases and insects injurious to live trees.

Assignment. Perley Spaulding, Northeastern Forest Experiment Station in cooperation with Bureau of Plant Industry and Bureau of Entomology.

MANAGEMENT

Project. Methods of cutting in pure and mixed spruce and balsam fir stands (Mc-1).

Scope. To determine (a) the best methods of cutting to use to secure satisfactory natural reproduction in the shortest possible time, and (b) the rate of growth of seedlings and larger trees left after cutting.

Status. Work started in October, 1923, in the spruce flat type near Moosehead Lake, Maine, and continued in the spruce hardwood, lower spruce, and upper spruce slope types in New Hampshire, Vermont, and New York during field season of 1924, thru the establishment of temporary sample plots. Studies made of reproduction before and after cutting, and of the growth of seedlings and larger trees left after cutting. Four permanent half-acre sample plots were established in the White Mountain National Forest during the summer of 1924. On plot 1 softwoods and hardwoods were cut to a low diameter limit. On plot 2 mature and over-mature softwoods were removed and hardwoods cut to favor the development of the residual, thrifty spruce and balsam fir. On plot 3 the softwoods were cut clear, leaving the hardwoods intact. Plot 4 was left untreated as a check plot.

Plans. Field work to be continued in the spruce flat and spruce slope types. A preliminary report on the reproduction and growth of spruce and balsam fir on cut-over lands will be prepared during 1925.

Assignment. M. Westveld, Northeastern Forest Experiment Station.

MANAGEMENT.

Project.	Pruning of white pine (Mp-1).
Scope.	To determine the effect of pruning on white pine at various ages and in stands of various densities.
Status.	New project. Comparatively little work has so far been done on pruning, and apparently nothing on the effect of pruning with very young trees.
Plans.	Three quarter-acre sample plots will be established in young plantations in 1925 at Mount Toby, one of which will be pruned the same spring, a second several years later, and the third left intact as a check plot. Additional plots may be established later.
Assignment.	P. W. Stickel, Northeastern Forest Experiment Station, in cooperation with the Massachusetts Agricultural College.

MENSURATION

Project. Development of universal taper and volume tables (ME-1).

Scope. To determine the conformity of various species to a form equation which can be used for the construction of standard taper curves, and the application of such curves in mensuration work.

Status. A manuscript covering the development of universal taper charts and volume tables and preliminary illustration of their application to western yellow pine was completed early in 1925. Field work covering intensive study of the application of the universal tables to red and white spruce and balsam fir, with special reference to determination of average form quotient and effect of butt swell and bark thickness, was carried on during the summer of 1924.

Plans. Additional field work and compilation of the results covering application to spruce and balsam fir, and perhaps to white and red pine, will be undertaken during 1925. Further study will be made of possible modification of the form quotient idea to derive a better index of form. Study of the mechanics and physiology of tree growth with special reference to factors controlling the distribution of wood on the stem will be undertaken, if possible.

Assignment. C. E. Behre, Northeastern Forest Experiment Station.

MENSURATION

Project. Growth and yield of spruce and balsam fir in the Northeast (ME-2).

Scope. To determine the growth and yield of spruce and balsam fir in different types and in even-aged and uneven-aged stands.

Status. Work started in Maine in September, 1923, and continued in 1924 in Maine, New Hampshire and Vermont. 240 temporary sample plots .1 to .25 acre in size have been located and measured in fully stocked, even-aged, second growth stands, and 60 more plots in even-aged stands not fully stocked to spruce and balsam fir, but containing a considerable percentage of these species. Use has also been made of 8 permanent sample plots at Corbin Park, N. H., and of 50 temporary plots taken by L. S. Murphy in his red spruce study. Computation of the results is now under way.

Plans. Some additional plots will be taken in 1925 in fully stocked stands with a considerable proportion of white spruce and balsam fir, and additional yield figures from partially stocked plots will be secured if necessary. Special attention will be paid to the application of normal yield tables, including as much field work as seems advisable. Permanent sample plots in both fully stocked and partially stocked stands will be established and treated by various methods as soon as sub-stations around which to group them can be selected. Manuscript on the yield of second growth stands of spruce and balsam fir will be prepared for publication during the year.

Assignment. W. H. Meyer, Northeastern Forest Experiment Station.

MENSURATION

Project. Regional Yields (ME-3).

Scope. To bring together systematically all available data on the present and potential growth and yield of different species and types in the Northeast.

Status. This is a part of a Service-wide project which originated with the compilation of all available growth and yield data for use in preparing the report on "Timber: Mine or Crop?" Material pertaining to it is being secured as an integral part of several projects now under way.

Plans. Additional data will be secured currently as opportunity offers in connection with other work of the Station.

Assignment. Staff, Northeastern Forest Experiment Station.

MENSURATION

Project. Manual on forest measurements (ME-4).

Scope. To prepare a manual on forest measurements with special reference to securing uniformity so far as practicable through the adoption of standard methods.

Status. A special committee has been organized to handle the work including three representatives each from the Forest Service, the Society of American Foresters, and the Association of State Foresters. Attention is being centered first on the standardization of volume table methods. Two distinct methods have been suggested and are now under consideration.

Plans. To continue the present work on standardization of volume table procedure, and to extend this as rapidly as possible to growth and yield.

Assignment. C. E. Behre, Northeastern Forest Experiment Station, in cooperation with other members of the special committee and other forest experiment stations.

PROTECTION

Project. Chestnut blight (Pd-1).

Scope. To study all phases of the chestnut blight, including the feasibility of perpetuating the chestnut by developing a blight-resistant variety or by other measures.

Status. A large amount of work has already been done on the life history of the blight and on the damage done by it under different conditions, and some work on the development of blight-resistant varieties.

Plans. To continue the investigations now under way, with special reference to the development of blight-resistant varieties.

Assignment. Perley Spaulding, Northeastern Forest Experiment Station, in cooperation with Bureau of Plant Industry, Office of Dendrology, and Brooklyn Botanic Garden.

PROTECTION

Project. Research on white pine blister rust (Pd-2).

Scope. Comprehensive study of the life history, epidemiology, and other scientific aspects of white pine blister rust.

Status. Work started in 1909. Experimental plots at North Conway, N. H.; Block Island, R. I.; Chestertown and Wilmington, N. Y. Present phase on work is on viability of spores and climatic effects.

Plans. To be continued along present lines.

Assignment. Perley Spaulding, Northeastern Forest Experiment Station, in cooperation with Bureau of Plant Industry and New York State College of Forestry and New York Conservation Commission.

PROTECTION

Project.	Pitch pine blister rust, Cronartium comptoniae (Pd-3).
Scope.	To determine the behavior of this native disease in comparison with the very closely related, but introduced, white pine blister rust.
Status.	Work started in 1909. Plots under observation at Glens Falls, N. Y., and many other points in New York and New England.
Plans.	To be continued along present lines.
Assignment.	Perley Spaulding, Northeastern Forest Experiment Station, in cooperation with Bureau of Plant Industry.

PROTECTION

Project.	Prediction of fire conditions (Pf, C-7).
Scope.	To work out methods for predicting periods of unusual fire hazard on basis of probable weather conditions and inflammability of fuels.
Status.	Preliminary tests of relative humidity (determined by the sling psychrometer) as an indicator of fire hazard have been made in Connecticut and New York. Arrangements have been made with the Weather Bureau tp issue fire weather warnings to State Foresters in 1925.
Plans.	Additional weather records, with particular reference to relative humidity, will be secured from different parts of the region. Methods of determining the inflammability of various fuels, and the relation of inflammability to weather conditions and fire hazard, will be studied as intensively as available funds permit.
Assignment.	S. T. Dana and P. W. Stickel, Northeastern Forest Experiment Station, in cooperation with Weather Bureau and State Foresters.

PROTECTION

Project.	Analysis of forest fire statistics (Pf, D-2).
Scope.	To secure from an intensive analysis of available records as complete and accurate information as possible in regard to forest fire hazard, risk and damage in different parts of the Northeast. Special attention will be paid to the relation between number and size of fires, damage, and cost, and such factors as cause, location, date, elapsed time, weather conditions, forest type, method of cutting and slash disposal, etc.
Status.	Records of forest fires in Massachusetts in 1921, 1922, and 1923 have been placed on punch cards, ready for analysis with tabulating machine.
Plans.	The data for Massachusetts will be analyzed, and work will be extended to other states as rapidly as possible.
Assignment.	S. T. Dana and P. W. Stickel, Northeastern Forest Experiment Station, in cooperation with State Foresters.

PROTECTION

Project. Control of gipsy moth by forest management (Pi-1).

Scope. To develop practical and effective measures for the control of the gipsy moth by forest management.

Status. Release cuttings on some of the 46 permanent sample plots were made by the Bureau of Entomology in the fall of 1923. Cleanings on three plots in New Hampshire and southern Maine were made by C. E. Behre of the Northeastern Forest Experiment Station in the summer of 1924. This will be the last weeding needed on most of the areas, although a few will require further attention in the next few years.

Plans. The Bureau of Entomology plans to keep up the work on these plots to insure the success of the plantations now so nearly established. Periodic inspection for infestation and defoliation will continue to be made.

Assignment. Office of Moth Control, Bureau of Entomology, with cooperation of Northeastern Forest Experiment Station for technical forestry advice and such field assistance as can be economically handled in connection with other work in the region.

PROTECTION

Project. Control of spruce budworm (Pi-2).

Scope. To determine the life history, spread, and control of the spruce budworm and its effect on tree growth.

Status. Previous work was continued during 1924 by the establishment of several hundred temporary sample plots from which data on rate of death in relation to site, percentage of death in relation to amount of hardwoods in stand, and spread of epidemics as determined by ring counts, were obtained. A series of plots in which girdling was done at different seasons was started to determine the possibility of girdling as a control measure. Some study was made of coast spruce to determine the reasons for its apparent immunity to death from budworm attack. A circular entitled "Estimating Forest Insect Damage" was published as Bulletin No. 3 of the Maine Forest Service.

Plans. Data already secured will be analyzed and field work continued with special reference to spread and to the effect of rate of growth, percentage of hardwood, exposure, and weather conditions on budworm damage. Girdling experiments will be continued and a study made of deterioration in relation to rate of growth.

Assignment. H. B. Peirson, Maine Forest Service, in cooperation with Northeastern Forest Experiment Station and Bureau of Entomology.

PROTECTION

Project. Control of miscellaneous forest insects (Pi-3).

Scope. Includes studies of the life history, damage, and control of various forest insects not covered by specific projects.

Status. Some study was made in 1924 of insects attacking larch, paper birch, and poplar, and of an unknown insect which seriously defoliated many trees in a large white pine plantation in Northern Maine. Notes have been prepared on insects attacking paper birch, poplar, and red pine, with suggestions as to control. Several interesting insect outbreaks were reported which it was impossible to follow up except by correspondence. The larch sawfly, larch case-bearer, and forest tent caterpillar were again active.

Plans. Additional information will be collected as opportunity offers, with special reference to the forest tent caterpillar, wood borers, larch sawfly, larch case-bearer, poplar borer, pales weevil, and mound-building ants.

Assignment. H. B. Peirson, Maine Forest Service, in cooperation with Northeastern Forest Experiment Station and Bureau of Entomology.

PROTECTION

Project.	Control of white pine weevil (Pi-4).
Scope.	To determine practical and effective measures for the control of the white pine weevil.
Status.	New project. Much work has already been done on the weevil problem, but additional information is needed on various points, and practical control measures have still to be developed.
Plans.	To secure additional information as to the life history and habits of the weevil, with particular reference to flight, hibernation, parasitism, and behavior in stands of different composition and spacing; and in the light of this to work out the entomological and silvicultural measures necessary to insure reasonably effective control.
Assignment.	H. J. MacAloney, Northeastern Forest Experiment Station, in cooperation with Bureau of Entomology, Harvard Forest, State Foresters, and Entomologists, and Entomological Branch, Dominion of Canada Department of Agriculture.

PROTECTION

Project. Status of European pine shoot moth (Pi-5).

Scope. To determine the present status of the European pine shoot moth, with special reference to the possibility of its eradication.

Status. New project. This insect is known to have been fairly well established for many years in ornamental and shade trees in Southern New England, and reports are current that it is now rather widely distributed on forest trees. Definite information, however, is lacking, either as to its exact distribution or as to the damage being caused by it.

Plans. A thorough-going survey of the situation will be made during May and June, 1925.

Assignment. Carl Heinrich, Bureau of Entomology, in cooperation with Northeastern Forest Experiment Station, and State Foresters and Entomologists.

FOREST TYPES

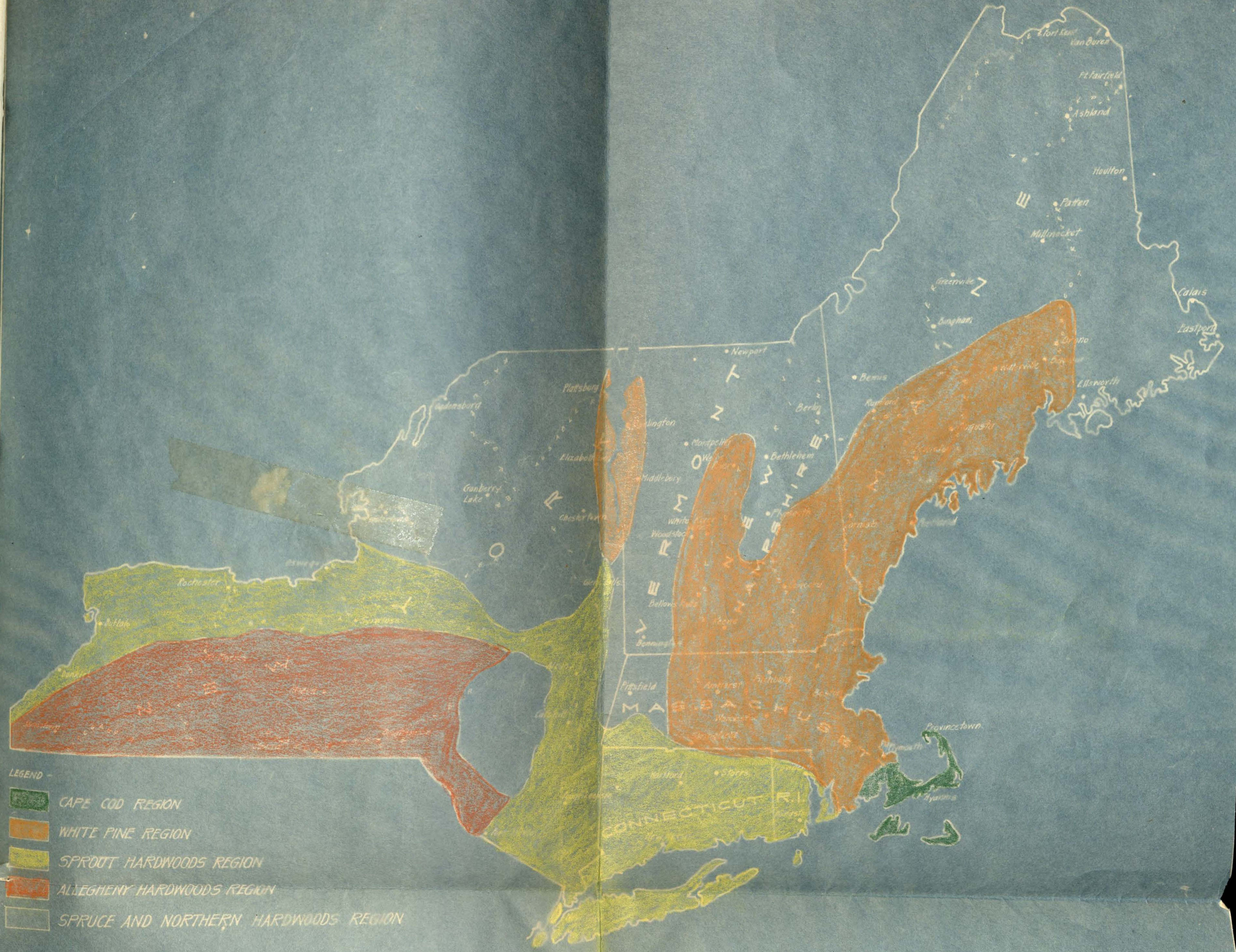
Project. Relation of light and soil moisture to tree growth (T-1).

Scope. To determine the role played by light and soil moisture in the establishmemt and subsequent development of different species under variour conditions.

Status. Progress was made in 1924 in the development of methods and in the measurement of light and moisture under different conditions in a white pine forest. Considerable work was also done on the characteristics of the different soils found on the permanent sample plots established on the White Mountain National Forest?

Plans. To be continued along the same lines. Equipment an and methods have now been developed to the point where continuous instrumental records over a considerable period are possible.

Assignment. P. R. Gast, Northeastern Forest Experiment Station, in cooperation with Harvard University.


LEGEND -
CAPE COD REGION
WHITE PINE REGION
SPROUT HARDWOODS REGION
ALLEGHENY HARDWOODS REGION
SPRUCE AND NORTHERN HARDWOODS REGION
Fort Kent
Van Buren
Ft. Fairfield
Ashland
Houlton
Patten
Millinocket
Greenville
Bingham
Calais
Eastport
Orono
Ellsworth
Bemis
Rumford
Newport
Berlin
Bethlehem
Plattsburg
Burlington
Montpelier
Middlebury
Elizabethtown
Cranberry Lake
Chestertown
Ogdensburg
Rochester
Buffalo
Syracuse
White River
Woodstock
Bellows Falls
Bennington
Pittsfield
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Storrs
Provincetown
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Hyannis
MAINE
NEW HAMPSHIRE
VERMONT
NEW YORK
MASSACHUSETTS
CONNECTICUT
R.I.

FOREST REGIONS OF THE NORTHEASTERN UNITED STATES.

Northeastern Forest Experiment Station,
P.W. Stickel, May, '25.